



## **Pollen, sediment and diatom response to past climate and environmental change in the Balkan region: the Holocene record of Lake Dojran (Greece/FYROM)**

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Lake Dojran (41°12'N, 22°44'E, 144 m a.s.l.) is located at the border between the F.Y.R. of Macedonia and Greece in a karstic basin formed by a combination of Tertiary volcanic and tectonic activities. The lake is fed by small rivers, creeks and springs, with most of the run off originating from the near Belasica and Kroussia Mountains. The area of Lake Dojran is influenced by the mountain climate of the central and northern Balkans. In addition, it is tempered by the influence of the Mediterranean Sea, to which it is exposed via the Thessaloniki Plain. The marine influence provides mild winters with high precipitation and long, hot, dry summers. The diverse natural vegetation has been heavily influenced by human activities, particularly during the historical era. Remnants of natural vegetation which survive are dominated by mesophilous plants, in particular deciduous oaks and ashes together with riparian elements such as alders and planes.

A 717 cm core was collected from the deepest part of the lake (ca. 6.6 m depth), in Macedonian waters. Thirteen radiocarbon dates carried out on terrestrial plant remains, charcoal, carbonate shell fragments, and bulk organic matter, established that the core covers the last ca. 12500 years, spanning the Younger Dryas to the present (1). Here, we build on previous sedimentological and diatom-based palaeolimnological research, strengthening the multi-proxy dataset by addition of palynological evidence for vegetation catchment change.

The Late Glacial was characterized first by an *Artemisia* steppe, followed by expansion of chenopods and then grasses, confirming the arid climate inferred from sedimentology and diatom data. The subsequent expansion of grasses matches with an increase in lake level inferred from changes in the diatom assemblages. Forest expansion at the onset of the Holocene is characterized by deciduous, semideciduous and evergreen oaks, with pine and fir, during an initial deepwater phase followed by shallowing towards the mid Holocene. Intensification of erosion after 2800 cal yr BP inferred from sedimentology (1) correlates clearly with palynological evidence for deforestation and the intensification of cultivation of cereals and fruit trees such as *Olea*, *Juglans* and *Castanea*. The palynological data also support diatom-based inferences that Late Holocene environmental change also incorporates a climatic shift towards aridification.

(1) Francke A., Wagner B., Leng M. J., Rethemeyer J., 2013. *Clim Past* 9: 481-498.

(2) Zhang X., Reed J., Wagner B., Francke A., Levkov Z., 2014. *Quat Sci Rev* 103: 51-66.